

4.3 pg. 175 # 1, 3, 5, 7, 9, 11

$$\begin{aligned} 1. \quad y &= \cos^{-1}(x^2) \quad \frac{dy}{dx} = \frac{-1}{\sqrt{1-(x^2)^2}} \cdot 2x \\ &= \frac{-2x}{\sqrt{1-x^4}} \end{aligned}$$

$$\begin{aligned} 3. \quad y &= \sin^{-1}(\sqrt{2}t) \\ \frac{dy}{dx} &= \frac{1}{\sqrt{1-(\sqrt{2}t)^2}} \cdot \sqrt{2} = \frac{\sqrt{2}}{\sqrt{1-2t^2}} \end{aligned}$$

$$5. \quad y = \sin^{-1}\left(\frac{3}{t^2}\right) = \sin^{-1}(3t^{-2})$$

$$\begin{aligned} \frac{dy}{dx} &= \frac{1}{\sqrt{1-(3t^{-2})^2}} \cdot -6t^{-3} = \frac{-6}{t^3 \sqrt{1-9t^{-4}}} \\ &= \frac{-6}{t^3 \sqrt{1-\frac{9}{t^4}}} = \frac{-6}{t^3 \sqrt{\frac{t^4-9}{t^4}}} = \frac{-6}{t \sqrt{t^4-9}} \end{aligned}$$

$$7. \quad y = x \sin^{-1}x + \sqrt{1-x^2}$$

$$\begin{aligned} \frac{dy}{dx} &= \sin^{-1}x + \frac{x}{\sqrt{1-x^2}} + \frac{1}{2}(1-x^2)^{-\frac{1}{2}}(-2x) \\ &= \sin^{-1}x + \frac{x}{\sqrt{1-x^2}} - \frac{x}{\sqrt{1-x^2}} \\ &= \sin^{-1}x \end{aligned}$$

9.  $X(t) = \sinh^{-1}\left(\frac{t}{4}\right) \quad t=3$

$$\begin{aligned} V(t) &= \frac{\frac{1}{4}}{\sqrt{1 - \frac{t^2}{16}}} = \frac{1}{4\sqrt{\frac{16-t^2}{16}}} = \frac{1}{4\frac{\sqrt{16-t^2}}{4}} \\ &= \frac{1}{\sqrt{16-t^2}} \quad V(3) = \frac{1}{\sqrt{16-9}} = \frac{1}{\sqrt{7}} = \frac{\sqrt{7}}{7} \end{aligned}$$

11.  $X(t) = \tan^{-1} t \quad t=2$

$$V(t) = \frac{1}{1+t^2} \quad V(2) = \frac{1}{1+4} = \frac{1}{5}$$